SCORING ASSESSMENT OF REGIONAL MATERIALS FOR GREEN HIGHWAY

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"The roots of education are bitter, but the fruit is sweet"- **Aristotle**

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ABSTRACT

The objectives of this study are to identify the criteria of regional material which is divided into two sub-criteria, local material and earthwork balance, to determine the score value for the criteria and to find the relevancy in applying them in Kuala Lumpur. The method used in data collection is through questionnaires survey given to 47 respondents from 13 highway companies in Kuala Lumpur. SPSS software was used to analyse the data. The scores for the criteria were determined by computing the average index value. The results showed an index score of 3.851 and 3.936 for local material and earthwork balance respectively which indicate that the results are significant. However, the data obtained are not sufficiently reliable to predict the agreement level as the results from regression analysis showed low values of R^2 of 0.143 and 0.041 for agreement towards local material and earthwork balance respectively. 11 out of 13 companies (84.61%) supported the usage of regional material as one of the criteria contributed to green highway

ABSTRAK

Objektif kajian ini adalah untuk mengenal pasti kriteria bagi *regional material* yang dibahagikan kepada dua sub-kriteria, bahan tempatan dan kerja tanah, yang digunakan untuk menentukan nilai skor untuk kriteria tersebut dan untuk menentukan kesesuaian penggunaan bahan tersebut dalam pembinaan lebuhraya hijau di Kuala Lumpur. Kaedah yang digunakan dalam pengumpulan data adalah melalui cara soal selidik yang diberikan kepada 47 orang responden daripada 13 syarikat lebuh raya di Kuala Lumpur. Perisian SPSS telah digunakan untuk menganalisis data. Markah skor untuk kriteria ditentukan dengan kaedah pengiraan nilai indeks purata. Hasil kajian menunjukkan skor indek masing-masing 3.851 dan 3.936 untuk bahan tempatan dan baki kerja tanah yang menunjukkan bahawa kajian ini memberi keputusan yang memuaskan. Walau bagaimanapun, data yang diperolehi tidak mencukupi untuk meramalkan tahap persetujuan responsen kerana hasil daripada analisis regresi menunjukkan nilai R^2 yang rendah iaitu 0,143 dan 0,041 untuk bahan tempatan dan baki kerja tanah. 11 daripada 13 syarikat (84.61%) menyokong penggunaan *regional material* sebagai salah satu kriteria yang menyumbang kepada lebuh raya hijau.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

SYMBOL	DESCRIPTION
a_i	Class on every frequency data
x_i	Frequency of respondents
i	Level of agreement 1 to 5
R	Regression
R^2	R square
CS	Cummulative score
Mean CS	Mean cumulative score
SD	Standard deviation

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

The realisation of the importance of sustainable and eco-friendly constructions has led to the development of green technology. Sustainable development has been defined by the United Nations as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Sustainability gives an attention to maintaining a balance on environmental, economic, and societal aspects in the construction. The approach of sustainable construction and with its underlying principles provides a comprehensive guide to enable the construction players to be more responsible to the environmental protection needs without neglecting the social and economic needs in striving for better living (Abidin and Jaapar, 2007).

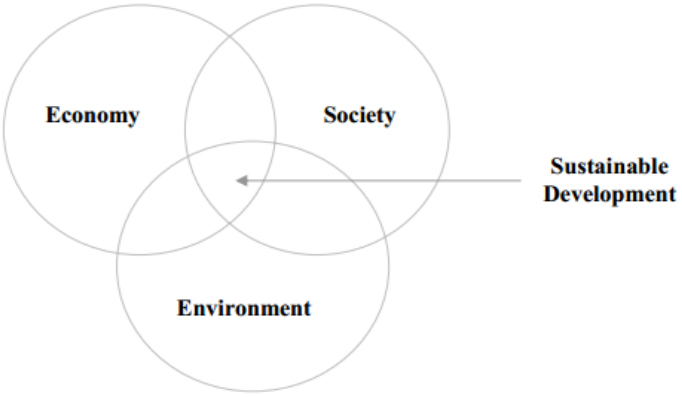

Figure 1.1: Economy, environment and society aspects in sustainable development

In the construction of infrastructures such as highway, the main aim is to produce structures that improve the quality of human life and at the same time it protects the environment efficiently and profitably. The construction is considered as sustainable if it covers the aspects that enhance quality of life and offer customer satisfaction, offer flexibility and the potential to cater for user changes in the future, provide and support desirable natural and social environments, and make sure to maximise the efficient use of resources.

One of the major elements in this new approach is the effort to have green highway. In order for the highway to be categorized as 'green', a standard measurement is required. This method of evaluation is based on score rating system. The development of sustainability rating systems is one indicator of the increased focus to address sustainability within the built environment (Thompson and Bashford, 2011). There are examples of rating systems that are already implemented elsewhere specifically for highway construction projects such as Greenroads, GreenLITES and GreenPave rating system. Green technology promises a sustainable environment towards a better life.

1.2 Background of Study

The development leads us to have a proper living style where the function of road cannot be denied. It is impossible to eliminate the need for roads and roadway improvements any time soon. Therefore, it is best for upcoming improvements are done as sustainably as possible. Higher concern about this matter among the experts in road construction, they start to introduce rating system in all practices.

Compared to most developed countries, Malaysia has not produced its own green highway index. That means we are still using the conventional approaches that may have negative impacts to the environment. Malaysia has only developed the Green Building Index (GBI) for sustainable building and development practices. It has been developed specifically for the Malaysian tropical weather, environmental and developmental context, cultural and social needs (Green Building Index

Manual). However, there is no green highway index established yet to focus on regional materials. Therefore, a study is needed to provide the info that leads to green index according to the situation in this country.

1.3 Objectives of Study

The aim of this study is to provide green index assessment which focuses on regional materials. This can be achieved by the following objectives:

1) To identify the criteria of regional materials used in highway,
2) To determine the score value for the regional materials, and
3) To find the relevancy in applying local material and earthwork balance in Kuala Lumpur

1.4 Scope of Study

The evaluation of green index assessment for materials and resources consists of criteria such as recycled and reused materials, sustainable resources, waste management, and green products. These studies only cover a small scope of sustainable resources by using regional materials. The survey is conducted to evaluate the application of waste minimization towards sustainability development in road construction. The sub-criteria of regional material are being observed and the data were taken in areas around Kuala Lumpur. The studies required the respondents' knowledge and experience in order to give suggestions related to green highway assessment.

1.5 Importance of Study

Study on regional materials is a part of green highway. By using regional materials, it means that the products used contain raw materials that are locally harvested, extracted or recovered. It also includes the element of earthwork balance which is under the primary stage in constructing the highway. An application of this material at site contributes to reduce transportation of vehicle (materials delivery), reduce energy consumption, reduce gas emission and as a result it will reduce the total cost of project. Not just that, it also improves local economic by using local material due to less demand of new material from supplier.

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